MODULE HANDBOOK

Course:	**Computational Physics**
Module Level:	Undergraduate
Code:	FIK305
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/Term:	6^{th} / Third Year
Module Coordinator(s):	Dr. Khusnul Ain, S.T., M.Si.
Lecturer(s):	Dr. Khusnul Ain, S.T., M.Si. and Dr. Ir. Soegianto Soelistiono, M.Si.
Language:	Bahasa Indonesia
Classification within the Curriculum:	Compulsory Course / ~~Elective Course~~
Teaching format / class hours per week during semester:	3 hours of lectures (50 min / hour)
Workload:	3 hours of lectures, 3 hours of structural activities, 3 hours of individual study, 13 weeks per semester, and total of 117 hours per semester 3.9 ECTS*
Credit Points:	3
Requirement(s):	(FIT 201) Mathematical Physics I and (FIT 202) Mathematical Physics II
Learning Goals/Competences:	**General Competence (Skill):** 1. Demonstrate knowledge to understand physical problems 2. To analyze physics problem by numerical method approachment and program's code in computers. **Specific Competence:** 1. Encode program to find the root of non linier equation with Regular False, Bisection, Newton, Secant methods 2. Encode program to solve linear equation system with Gauss elimination, Gauss Jordan, inverse, Jacobi and Gauss-Seidel methods 3. Encode program to solve interpolation and data fitting problems 4. Solve ordinary differential equation by Euler, Heun, polygon, and runge-kutta methods 5. Solve numerical of laplace and poisson equation with finite difference method 6. Solve numerical heat transfer equation with Cranck-Nicolson method 7. Apply fourier transform principles to solve physics problems 8. Apply monte-carlo method in integral cases
Contents:	Numerical methods, error, non linier root finding (Regular False, Bisection, Newton, Secant) linear equation system (Gauss elimination methods, Gauss Jordan, inverse, Jacobi, Gaus-Seidel) interpolation, fitting data ordinary differential equation (Euler, Heun, polygon repaired, Runge Kutta) partial differential equation (Crank-Nicolson methods, Laplace equation, Poisson equation, parabolic equation, hyperbolic equation) diffusion equation; finite difference (domain, grid point, forward, backward, central difference) Fourier transform, introduction of monte carlo methods by random generator, integral solution by monte carlo.

Soft Skill Attribute:	Effort and ethic
Study/Exam Achievements:	Students are considered competent and eligible to pass the course upon obtaining at least 40 of maximum score for the exams (midterm test and final exam), structured activity (group discussion). Final score is calculated as follow: 20% assignment 1 + 20%assignment 2 + 30% midterm + 30% final exam Final grade is defined as follow: A : 75 – 100 AB : 70 - 74.99 B : 65 - 69.99 BC : 60 - 64.99 C : 55 - 59.99 D : 40 - 54.99 E : 0 - 39.99
Forms of Media:	Powerpoint slides, LCD projectors and whiteboards
Learning Methods:	Lecture, assessments and group discussion
Literature(s):	1. Capra, S.C. and R.P. Canale, 2002, *Numerical Methods for Engineer*s, 4th ed, Mc Graw Hill, Singapore. 2. Cullen, C.G., 1991, *Linear Algebra and Differential Equation*, 2nd ed., Prentice Hall. 3. DeVries, P.L., 1994, *A First Course in Computational Physics*, John Wiley & Sons, New York. 4. Gerald Curtis F. dan O. Wheatley, 1985, *Applided Numerical Analysis*, Addison-Wesley, Massachusetts
Notes:	*Total ECTS = {(total hours workload × 50 min) / 25 hours Each ECTS is equals with 25 hours.